

# Chowilla Creek Environmental Regulator and Ancillary Structures - *Summary of 2014 testing*

*Successful testing of the new environmental water management infrastructure on the Chowilla Floodplain took place in 2014. It was the culmination of many years of work by many people within DEWNR, SA Water, the MDBA, a range of scientific organisations and the community. The testing has provided opportunities for further learning and adaptive management over the coming years.*

## Objectives

The main objective of the testing was to ensure the new structures – regulators, equipment associated with operation of the regulators, and fishways – function safely and in accordance with design specifications.

Testing also provided an opportunity to validate the models that underpin the Operation Plan, and collect data to inform future operations.

The testing also aimed to achieve ecological objectives, including to:

1. reduce soil salinity and improve soil moisture in inundated areas
2. improve the health of river red gum, black box and cooba trees and support the growth of seedlings and saplings that have established following recent flooding and environmental watering
3. improve the condition of lignum in inundated areas and provide conditions to support the growth of flood dependent and aquatic vegetation
4. provide breeding habitat for waterbirds, frogs and invertebrates
5. allow the transport of carbon and nutrients from the floodplain to the river to support food webs.



Waterbirds over Lake Limbra during testing event, Photo: Todd Wallace.



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# Chowilla Floodplain infrastructure tested

The following new Chowilla Floodplain infrastructure were tested (see map on page 4):



Chowilla Creek environmental regulator

Photo: Todd Wallace.



Woolshed Creek South regulator.



Woolshed Creek East regulator.



Chowilla Island Loop Ancillary Regulator.



Chowilla Island Loop Channel regulator.



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The testing also involved the simultaneous operation of Locks 5 and 6 and the Pipeclay and Slaney Creek weirs. These weirs were built around 1930, at the same time as Lock 6, and have been significantly upgraded, as part of the Chowilla project, to improve flow management in the Chowilla anabranch. Fishways have also been installed in the upgraded Pipeclay and Slaney weirs to allow the movement of fish of all sizes through the structures.



Pipeclay Creek Weir prior to upgrade.

Pipeclay Creek Weir after the upgrade and installation of fish passage.



Slaney Creek Weir after upgrade and installation of fish passage.



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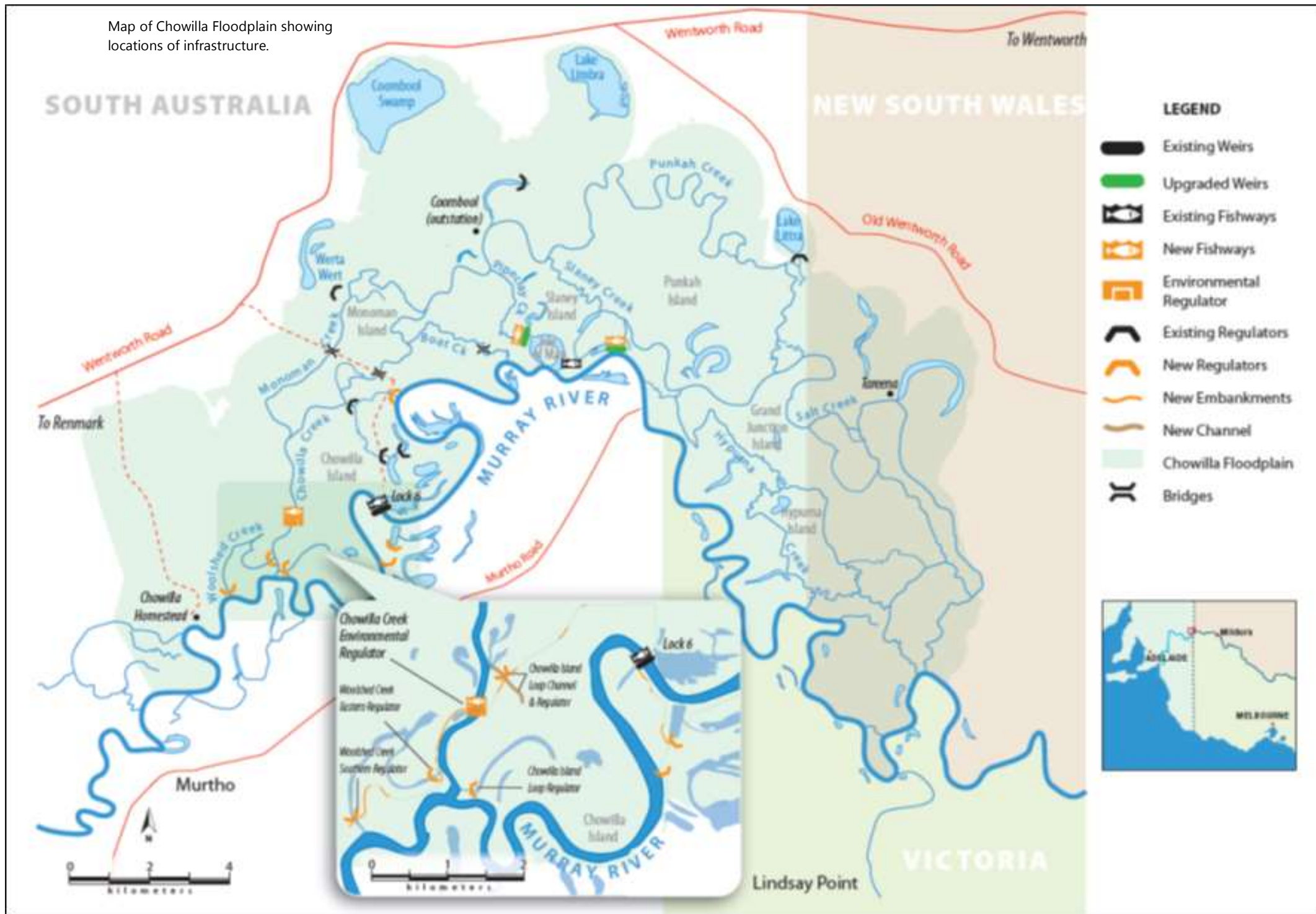


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Map of Chowilla Floodplain showing locations of infrastructure.





# Overview of the testing

## Timing

Testing commenced on 8<sup>th</sup> September 2014 and concluded in the first week of December 2014. The Lock 6 pool water level was raised over eight weeks, from late September to mid-November. The timing was chosen to coincide with increased spring flows into South Australia and to ensure testing was completed before water temperatures rose in summer, potentially increasing risks to water quality.

## Testing new infrastructure

The testing involved the progressive positioning of stop logs between the concrete piers at the Chowilla Regulator to raise water levels in Chowilla Creek and the anabranch by up to approximately 2.75 metres, which corresponds to a 'medium level' operational height of 19.1 metres with respect to Australian Height Datum (mAHD). Flow was maintained over the regulator throughout the testing as will occur through any operation.

As water levels were raised, flows also passed through structures on the Chowilla Island Loop and through the Woolshed Creek South and East regulators, enabling these structures to be tested. Testing also involved the operation of the vertical slot fishway at the Chowilla Regulator.

Engineering checks and monitoring were undertaken throughout the testing to ensure that the regulator was operating as it was designed to. All of the structures operated to design specifications.



Looking over the Chowilla Regulator in operation, with the Coppermine wetland complex in background.  
Photo: Callie Nickolai.



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## Operation of existing and upgraded structures during the testing

As water levels were increased behind the Chowilla Regulator, Lock 6 was progressively raised to 40 cm above the normal pool level to the target height of 19.65 mAHD. Raising Lock 6 in conjunction with the operation of the Chowilla Regulator was important; it ensured that flow velocities through the Chowilla anabranch were maintained and it increased the area of floodplain inundated. This is important to enable the management of water quality and support the maintenance of critical flowing habitat for native fish, including Murray cod. While lower scale raisings of Lock 6 have occurred in the past, this was the first time it has been raised by 40 cm.

The gates on the recently upgraded weirs on Pipeclay and Slaney creeks were fully opened during the testing. This allowed sufficient flows to pass through the Chowilla anabranch, to manage water quality and maintain areas of high flow velocity (which provide important fish habitat). Fishways recently installed at these weirs were operated throughout the testing.

Lock 5 was raised by 10 cm to ensure there were appropriate water levels in the Chowilla regulator fishway. Raising Lock 5 by this amount is within the normal operating range for this structure.

## Environmental water used

A total of 104 gigalitres (GL) of environmental water was provided from the Murray-Darling Basin Authority's The Living Murray to cover the water consumed through seepage and evaporation, provide water to raise levels behind the regulator, and provide additional passing flow through the Chowilla anabranch and along the River Murray Channel to manage potential water quality impacts.

17.2 GL of environmental water was consumed during the testing through evaporation, seepage and water retention on the floodplain and in wetlands. The remaining 87 GL either remained within the river channel or was passed through the anabranch back to the River Murray as return flows to downstream sites.

Testing also coincided with the delivery along the River Murray of environmental water by the Commonwealth Environmental Water Holder (CEWH) to downstream sites.

## Inundation extent

Approximately 2,300 hectares of the Chowilla Floodplain and wetland areas along the Lock 6 upper pool reach were inundated during testing (see Landsat image below for the full extent). This equates to a roughly 50,000 to 60,000 ML/day flow event.



Inundation of Gum Flat and the surrounding floodplain during testing.

Photo: Callie Nickolai



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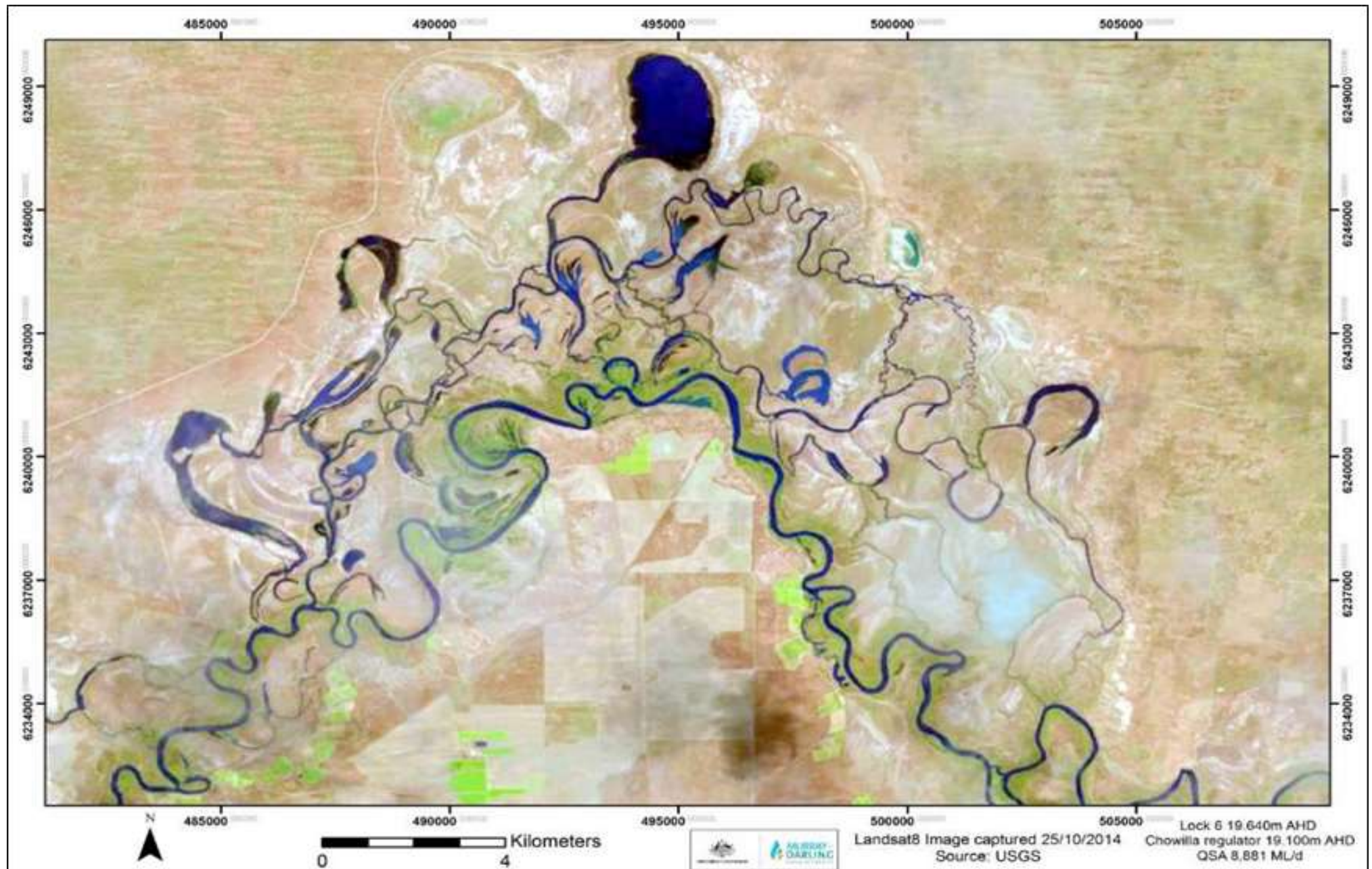


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Landsat image showing Chowilla Floodplain area inundated (approximately 2,300 hectares) at the peak of the testing



## Monitoring observations

A range of planned and opportunistic monitoring took place during testing. Data is being analysed and detailed reports are being prepared.

Positive responses were observed in floodplain vegetation (including aquatic vegetation, understorey plants and trees) and a significant frog breeding response during and following the testing. Twenty five species of waterbirds were recorded in wetlands including high numbers of pink eared ducks and waders such as avocets.

A highly productive response to the watering was noted from macro-invertebrates and zooplankton. Unfortunately very large numbers of juvenile European carp were recorded at a number of sites, along with seven species of native fish. Wetlands with abundant invertebrates and fish such as Lake Limbra provided a rich feeding ground for birds.



Waterbirds on Lake Limbra during the testing event Photos: Todd Wallace



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Six species of frogs were recorded at all eight of the wetland sites monitored during the testing, including the Southern bell frog which is listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*.

A very strong frog breeding response was also observed with foam spawn nests from *Limnodynastes spp.* and tadpoles recorded at many sites across the floodplain.

The primary objective was to test the new infrastructure, therefore the event was relatively short with water levels held at the peak height for only two weeks. Given the strong frog response, there was concern about maintaining sufficient habitat long enough for frogs to complete their breeding cycles. To achieve this, the structures at Lake Limbra and Werta Wert wetlands were closed to retain water at those sites for longer.



Frog foam spawn nests



Southern Bell Frog

Monitoring of water quality was undertaken throughout the event, particularly for salinity and dissolved oxygen via a network of monitoring stations and by taking manual readings during the event. Results were within target levels.

Fish monitoring was undertaken in a number of wetlands. Murray cod movement and habitat use was monitored by SARDI.

DEWNR ecologists identifying and counting fish species during the testing event



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Some water remained in the deeper wetlands such as Coppermine Waterhole providing clear benefits to aquatic and surrounding wetland vegetation.



Vegetation responding to watering at Coppermine Waterhole.



Lignum provides habitat for a wide range of species. It responded strongly across the watering sites.



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Monitoring of vegetation condition, soils and salinity is continuing and the scale of benefit and the contribution towards achieving Chowilla's ecological targets is being assessed.

The testing has provided benefits across large areas but there are still many areas on the floodplain where vegetation is severely stressed.



Large areas of the floodplain are still declining in health due to the reduced frequency of flooding. Photo: Callie Nickolai.

## Communications and community involvement

Tours of the site were held for the Chowilla Community Reference Committee (which has been meeting since 2004) and with the First Peoples of the River Murray and Mallee region. A Twilight Tour to Chowilla also took place in December 2014 in conjunction with the Renmark to Border Local Action Planning Group, giving community members a chance to see the wonderful response of plants and animals as a result of the testing event.

Community Reference Committee members at Coppermine Waterhole after the testing



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## The future

The testing provided benefits in large areas but there are still many areas on the floodplain where vegetation is severely stressed.

Further testing in 2015 is being considered. The decision to operate the environmental regulator will be based on a range of factors including assessments of the condition of the floodplain, in particular vegetation health. Other factors that will influence potential future regulator operation include the level of flow in the River Murray and the availability of environmental water.

Chowilla infrastructure provides great potential for broad scale floodplain recovery but there is still a lot to learn during the next phases of testing about how to gain maximum benefits while ensuring risks are managed.

## FOR MORE INFORMATION

Department of Environment, Water and Natural Resources

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### Further information is also available at these websites:

Department of Environment Water and Natural Resources (SA)

<http://www.environment.sa.gov.au/chowilla-floodplain>

Chowilla Game Reserve

<http://www.environment.sa.gov.au/parks/>

Natural Resources South Australian Murray Darling Basin

<http://www.naturalresources.sa.gov.au/samurraydarlingbasin/home>

The Living Murray

<http://www.mdba.gov.au/>

Commonwealth Environmental Water Holder

<http://www.environment.gov.au/ewater/>

The Living Murray is a joint initiative funded by the New South Wales, Victorian, South Australian, Australian Capital Territory and Commonwealth governments and coordinated by the Murray-Darling Basin Authority (MDBA).

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